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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/736,067	12/13/2000	Paul W. Jones	81596PCW	7724

7590 10/01/2003

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EXAMINER	
KIM, CHONG R	

ART UNIT	PAPER NUMBER
2623	5

DATE MAILED: 10/01/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/736,067	JONES ET AL.	
	Examiner	Art Unit	
	Charles Kim	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-40 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-40 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 26 April 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

1. Claims 19 and 38 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. More specifically, the applicant's specification is non-enabling in regards to how the "decompression" processing removes noise prior to the embedding the watermark signal. It appears that the applicant's specification (pages 14-15) provides support on how the compression processing removes the system noise, but fails to provide support for decompression processing. For examination purposes, the phrase "wherein the processing is compression and decompression" in lines 1-2 will be interpreted as "wherein the processing is compression", as supported on pages 14-15 of the applicant's specification.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2. Claim 40 is rejected under 5 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. More specifically, claim 40 is drawn to an image, which is merely a matrix of data values. Regardless of how the values are computed, they are nonetheless considered mere data.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-3, 6-10, 13, 20-22, 25-29, 32, 39, 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Daly et al., U.S. Patent No. 5,859,920 ("Daly") and Rhoads, U.S. Patent No. 6,567,533 ("Rhoads-533").

Referring to claim 1, Daly discloses a method for embedding a watermark signal that contains message data in a digital image represented as a two-dimensional array of pixel values, comprising the steps of:

a. providing a dispersed message image having pixel values representative of the message data (col. 7, lines 42-61)

b. modifying each pixel value of the dispersed message image as a function of the digital image (col. 7, lines 62-67)

c. combining the modified dispersed message image with the digital image to produce a watermarked image (col. 8, lines 11-14).

Daly explains that the pixels of the dispersed message image are modified as a function of the digital image, as noted above, but fails to teach that each pixel value of the dispersed message image is modified as a function of the corresponding pixel value in the digital image. However, this feature was exceedingly well known in the art. For example, Rhoads-533 discloses a method for embedding a watermark signal in a digital image that includes the step of modifying each pixel value of the a message image as a function of the corresponding pixel value in the digital image [col. 8, lines 29-63. Rhoads-533 explains that each pixel value (Vcomp; n,m) of the message image (composite embedded signal) is modified by a scaling factor (X*sqrt(4 + Vorig; n,m ^Y)), see equation 3. Note that the scaling factor is a function of the corresponding pixel value in the digital image (Vorig; m,n)].

Daly and Rhoads-533 are both concerned with embedding a watermark signal in a digital image based on the noise characteristics of the image. Daly is concerned with extracting the watermark when the digital image may have been rotated (Daly, col. 10, lines 10-11). Rhoads-533's method allows the watermark to be extracted from the image even if the image has been scaled and rotated, thereby increasing the resistance of the watermark (Rhoads-533, col. 1, lines 53-55). Therefore, it would have been obvious to modify step (b) of Daly, so that each pixel value of the dispersed message image is modified as a function of the corresponding pixel value in the digital image, as taught by Rhoads-533, in order to increase the resistance of the watermark, thereby enhancing the embedding process.

Referring to claim 2, Daly further discloses that the step of providing a dispersed message image, comprises the steps of producing a message image presenting the message data, providing a carrier image, and convolving the message image with the carrier image to produce the dispersed message image (col. 7, lines 42-46 and figure 7).

Referring to claim 3, Daly further discloses that the carrier image has random phase (col. 7, lines 19-22).

Referring to claim 6, Daly further discloses that the step of modifying each pixel of the dispersed message image comprises multiplying the pixel by a scaling factor representative of a specified system signal-depend noise (col. 7, line 62-col. 8, line 10).

Referring to claim 7, Daly further discloses the step of extracting the message data from the watermarked image (col. 5, lines 48-65).

Referring to claim 8, see the rejection of at least claim 6 above.

Referring to claim 9, Daly further discloses the step of extracting the message image from the watermarked image by correlating the carrier with the watermarked image (col. 5, lines 48-51).

Referring to claim 10, see the rejection of at least claim 8 above. Daly and Rhoads-533 fail to explicitly teach the steps of forming an estimate of the scaling factor for each pixel value in the dispersed message image, and dividing each pixel value of the watermarked image by the corresponding estimated scaling factor prior to extracting the message data from the watermarked image.

The Examiner notes that it was well known that the process of extracting a watermark from a digital image is characterized as the reverse process of embedding the watermark. In

other words, the steps involved to embed the watermark is performed in reverse order to extract the watermark. In this case, Daly explains that each pixel of the message image is multiplied by a scaling factor (as noted above). The Examiner notes that the reverse process for this step would be to divide each pixel of the watermarked image by the corresponding scaling factor. Therefore, it would have been obvious to divide the watermarked image by the corresponding estimated scaling factor prior to extracting the message from the watermarked image, in order to undo the changes introduced by the embedding process, thereby ensuring that the extracted watermark is accurate and reliable.

Referring to claim 13, Daly further discloses that the specified system signal-dependent noise is representative of film grain noise (col. 7, line 65-col. 8, line 10).

Referring to claims 20, 39, 40, see the rejection of at least claim 1 above.

Referring to claim 21, see the rejection of at least claim 2 above.

Referring to claim 22, see the rejection of at least claim 3 above.

Referring to claim 25, see the rejection of at least claim 6 above.

Referring to claim 26, see the rejection of at least claim 7 above.

Referring to claim 27, see the rejection of at least claim 8 above.

Referring to claim 28, see the rejection of at least claim 9 above.

Referring to claim 29, see the rejection of at least claim 10 above.

Referring to claim 32, see the rejection of at least claim 13 above.

4. Claims 4, 11, 12, 14, 23, 30, 31, 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Daly et al., U.S. Patent No. 5,859,920 ("Daly") and

Rhoads, U.S. Patent No. 6,567,533 ("Rhoads-533"), further in view of Rhoads, U.S. Patent No. 6,496,591 ("Rhoads-591").

Referring to claim 4, Daly further discloses that the carrier image has a Fourier amplitude that models the Fourier amplitude of a noise signal (col. 7, lines 19-22. Note that the carrier image and the noise signal are in the frequency domain, and therefore have Fourier amplitude). However, Daly and Rhoads-533 fail to teach that the carrier image has a Fourier amplitude that models the Fourier amplitude of a specified system noise.

Rhoads-591 discloses a carrier image that models a specified system noise (col. 23, lines 11-16. Note that the "noise generated directly from application instrumentation" in line 13 is interpreted as a specified system noise).

Daly, Rhoads-533, and Rhoads-591 all are concerned with embedding a watermark signal in a digital image based on noise characteristics. Rhoads-591 explains that utilizing a carrier image based on the specified system noise provides absolute security (Rhoads-591, col. 23, lines 18-20). Therefore, it would have been obvious to modify the Fourier amplitude of the carrier image of Daly and Rhoads-533, so that it models a specified system noise, as taught by Rhoads-591, in order to increase the security of the system, thereby enhancing the watermarking process.

Referring to claim 11, Rhoads-591 discloses that the specified system noise is representative of the application instrumentation, as noted above, but fails to explicitly teach that the specified system noise is representative of image sensor noise. However, the Examiner notes that Rhoads-591 is concerned with processing digital images (note that a image sensor is inherent for digital images). Therefore, it would have been obvious to modify the specified system noise

so that it is representative of image sensor noise, since Rhoads-591's application instrumentation includes an image sensor.

Referring to claim 12, Daly discloses that the specified system signal-dependent noise is representative of film grain noise (col. 7, line 65-col. 8, line 10).

Referring to claim 14, see the discussion of claims 6 and 12 above.

Referring to claim 23, see the rejection of at least claim 4 above.

Referring to claim 30, see the rejection of at least claim 11 above.

Referring to claim 31, see the rejection of at least claim 12 above.

Referring to claim 33, see the rejection of at least claim 14 above.

5. Claims 5, 15-17, 24, 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Daly et al., U.S. Patent No. 5,859,920 ("Daly") and Rhoads, U.S. Patent No. 6,567,533 ("Rhoads-533"), in view of Roads, U.S. Patent No. 6,496,591 ("Roads-591"), further in view of Honsinger et al., U.S. Patent No. 6,044,156 ("Honsinger").

Referring to claim 5, see the discussion of at least claim 4 above. Daly, Rhoads-533, and Rhoads-591 explain that the carrier image has a Fourier amplitude that models the specified system noise, as noted above (claim 4), but fail to teach that the carrier image contains a ramp from zero for low frequencies.

Honsinger teaches a carrier image that contains a ramp from zero for low frequencies (col. 7, lines 11-45).

Daly, Rhoads-533, Rhoads-591, and Honsinger are all concerned with embedding a watermark signal in a digital image. Honsinger's method reduces the impact of the image on the

recovered message, thereby improving the integrity of the recovered message (Honsinger, col. 7, lines 4-14). Therefore, it would have been obvious to modify the carrier image of Daly, Rhoads-533, and Rhoads-591, so that it contains a ramp from zero for low frequencies, as taught by Honsinger, in order to improve the integrity of the recovered message, thereby enhancing the watermarking process.

Referring to claim 15, see the discussions of claims 4 and 5 above. The combination of Daly, Rhoads-533, Rhoads-591, and Honsinger teach a carrier image having a Fourier amplitude that matches the high frequencies of the Fourier amplitude of the specified system noise and contains a ramp from zero for low frequencies, as noted above (claim 5). Note that the resultant carrier image does not match the specified system noise due to the ramp from zero for low frequencies. Also as noted above (claim 4), Rhoads-591 explains that matching a carrier image to a specified system noise provides absolute security (Rhoads-591, col. 23, lines 18-20). The Examiner notes that in order to match the carrier image to the specified system noise, low frequency noise must be added to the carrier image (due to the ramp from zero for low frequencies). Therefore, it would have been obvious to add low frequency noise to the carrier image to match the system specified noise, in order to increase the security of the system, thereby enhancing the watermarking process (Note that adding low frequency noise to the carrier image results in low frequency noise being added to the dispersed message image).

Referring to claim 16, see the discussion of at least claim 9 above.

Referring to claim 17, see the discussions of claims 5 and 9 above. Daly explains that the step of extracting the message image from the watermarked image is performed by correlating the watermarked image with the carrier signal, as noted above (claim 9). However, Daly,

Rhoads-533, and Rhoads-591 fail to teach that the carrier image has a Fourier amplitude that matches the high frequencies of the Fourier amplitude of the specified system noise and contains a ramp from zero for low frequencies.

The combination of Daly, Rhoads-533, Rhoads-591, and Honsinger teach a carrier image having a Fourier amplitude that matches the high frequencies of the Fourier amplitude of the specified system noise and contains a ramp from zero for low frequencies, as noted above (claim 5). Therefore, it would have been obvious to modify the step of extracting the message from the image, so that it is performed by correlating the watermarked image with the (second) carrier image having a Fourier amplitude that matches the high frequencies of the Fourier amplitude of the specified system noise and contains a ramp from zero for low frequencies, as taught by Daly, Rhoads-533, Rhoads-591, and Honsinger, in order to improve the integrity of the recovered message, thereby enhancing the watermarking process.

Referring to claim 24, see the rejection of at least claim 5 above.

Referring to claim 34, see the rejection of at least claim 15 above.

Referring to claim 35, see the rejection of at least claim 16 above.

Referring to claim 36, see the rejection of at least claim 17 above.

6. Claims 18-19, 37-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Daly et al., U.S. Patent No. 5,859,920 ("Daly") and Rhoads, U.S. Patent No. 6,567,533 ("Rhoads-533"), further in view of Acharya et al., U.S. Patent No. 6,449,380 ("Acharya").

Referring to claim 18, Daly and Rhoads-533 fail to explicitly teach that the digital image has been processed to remove system noise prior to embedding the watermark signal. However, this feature was exceedingly well known in the art. For example, Acharya discloses a watermarking process wherein the digital image is processed (compressed) to remove system noise prior to embedding the watermark signal (col. 4, lines 1-47. Note that compressing the digital image will remove the system noise).

Daly, Rhoads-533, and Acharya are all concerned with embedding a watermark in a digital image. Acharya's method provides added level of security, allows secure image data representation and secure movement of signal information (Acharya, col. 6, lines 23-32). Therefore, it would have been obvious to process the digital image of Daly and Rhoads-533 to remove the system noise prior to embedding the watermark signal, as taught by Acharya, in order to enhance the security of the watermarking system.

Daly further discloses that the watermark signal represents system noise (col. 7, line 62-col. 8, line 20). Therefore, the resultant watermarked image will have the appearance of containing system noise.

Referring to claim 19, Acharya further discloses that the processing is compression (col. 4, lines 1-47).

Referring to claim 37, see the rejection of at least claim 18 above.

Referring to claim 38, see the rejection of at least claim 19 above.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Wen et al. U.S. Patent No. 6,130,741 discloses a method for embedding a watermark in a digital image where in the parameters for embedding the watermark are adjusted according to the film property.

b. Hannigan et al. U.S. Patent No. 6,535,617 discloses a method for removing noise from an image, and embedding a watermark signal.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles Kim whose telephone number is 703-306-4038. The examiner can normally be reached on Monday thru Thursday 8:30am to 6:00pm and alternating Fridays 9:30am to 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on 703-308-6604. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-0377.

ck
ck
September 19, 2003

Jon Chang
Jon Chang
Primary Examiner